

**PCT**WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>C23C 16/26, H01M 8/10, B05D 5/12</b>	<b>A1</b>	(11) International Publication Number: <b>WO 99/13128</b>
		(43) International Publication Date: 18 March 1999 (18.03.99)

(21) International Application Number: PCT/US98/18938

(22) International Filing Date: 11 September 1998 (11.09.98)

(30) Priority Data:  
08/927,739 11 September 1997 (11.09.97) US(71) Applicant (for all designated States except US): SOUTHWEST  
RESEARCH INSTITUTE [US/US]; 6220 Culebra Road,  
P.O. Drawer 28570, San Antonio, TX 78238 (US).(71)(72) Applicants and Inventors: DEARNALEY, Geoffrey  
[GB/US]; 19826 Wittenburg, San Antonio, TX 78256 (US).  
ARPS, James, H. [US/US]; 6410 Lost Arbor, San Antonio,  
TX 78240 (US).(74) Agent: MORRIS, Paula, D.; Madan & Morris PLLC, Suite 700,  
2603 Augusta, Houston, TX 77057 (US).(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR,  
BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE,  
GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ,  
LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW,  
MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL,  
TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO  
patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian  
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European  
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR,  
IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF,  
CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).**Published***With international search report.  
With amended claims.*

(54) Title: A METHOD OF DEPOSITING AN ELECTROCATALYST AND ELECTRODES FORMED BY SUCH METHOD

## (57) Abstract

Fuel cell electrodes comprising a minimal load of catalyst having maximum catalytic activity and a method of forming such fuel cell electrodes. The preferred method comprises vaporizing a catalyst, preferably platinum, in a vacuum to form a catalyst vapor. A catalytically effective amount of the catalyst vapor is deposited onto a carbon catalyst support on the fuel cell electrode. The electrode preferably is carbon cloth. The method reduces the amount of catalyst needed of a high performance fuel cell electrode to about 0.3 mg/cm<sup>2</sup> or less, preferably to about 0.1 mg/cm<sup>2</sup>. The electrocatalytic layer formed comprises unique, rod-like structures.